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(54) Title: METHOD AND APPARATUS FOR SPREAD-ADJUSTED ELECTRONIC RISKLESS PRINCIPAL TRADING (54) Titre: PROCÉDE ET APPAREIL D'ÉCHANGES COMMERCIAUX ÉLECTRONIQUES A MARGE AJUSTÉE SANS RISQUE POUR LE MANDANT		
(57) Abstract <p>An automated system for asset trading transactions maximizes the returns to the principals. The system preferably includes a distributed data entry and display system (500), coupled to a central processor (510) through an appropriate network (508), such as the internet. Upon receipt of information concerning a position, a plurality of alternative adjusted prices are formulated to reflect consideration of potential pricing variables, including the nature of the asset, the character of the principal, the character of potential contra positions, and the like. The spread-adjusted prices are then compared to contra spread-adjusted prices for the same asset previously entered into the system. If a match is not identified the system allows for direct, albeit anonymous contact between the initiating position and one or more contra positions for purposes of negotiating a trade. Alternatively, an asset may be entered into the system for a bid or auction process. The spread-adjusted prices may be further adjusted at the position of a system operator to facilitate trading.</p> <p>(57) Abrégé</p> <p>Cette invention se rapporte à un système automatisé destiné à servir de cadre à des transactions d'échange de biens, en vue de maximiser le revenu des mandants. Ce système utilise de préférence un système d'entrée et d'affichage de données réparti (500), couplé à un processeur central (510) par l'intermédiaire d'un réseau approprié (508), tel que l'Internet. Après réception des informations concernant une position, plusieurs prix ajustés alternatifs sont formulés pour refléter les considérations relatives aux variables de fixation des prix potentiels, telles que la nature du bien, le caractère du mandant, le caractère des positions de contrepartie potentielles. Des prix avec marge ajustée sont ensuite comparés aux prix de contrepartie avec marge ajustée pour le même bien préalablement entré dans le système. Si une correspondance n'est pas identifiée, le système permet un contact direct bien qu'anonyme entre la position initiatrice et une ou plusieurs positions de contrepartie, en vue de permettre la négociation d'un échange. Dans une variante, un bien peut être entré dans le système pour faire l'objet d'un processus d'offre publique ou de mise aux enchères. Les prix avec marge ajustée peuvent être ajustés par la suite sur la position d'un opérateur du système en vue de faciliter l'échange.</p>		

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<b>(21) International Application Number:</b> PCT/US99/30763 <b>(22) International Filing Date:</b> 22 December 1999 (22.12.99) <b>(30) Priority Data:</b> 09/220,621 24 December 1998 (24.12.98) US <b>(71) Applicant:</b> AUTOMATED TRADING SYSTEMS, INC. [US/US]; 230 Park Avenue, New York, NY 10169 (US). <b>(72) Inventor:</b> HANSON, Stephen, M.; 245 Blackheath Road, Lido Beach, NY 11561 (US). <b>(74) Agents:</b> BONDELL, Jay, A. et al.; Schweitzer Cornman Gross & Bondell LLP, Suite 2200, 230 Park Avenue, New York, NY 10169 (US).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> METHOD AND APPARATUS FOR SPREAD-ADJUSTED ELECTRONIC RISKLESS PRINCIPAL TRADING   <b>(57) Abstract</b> <p>An automated system for asset trading transactions maximizes the returns to the principals. The system preferably includes a distributed data entry and display system (500), coupled to a central processor (510) through an appropriate network (508), such as the internet. Upon receipt of information concerning a position, a plurality of alternative adjusted prices are formulated to reflect consideration of potential pricing variables, including the nature of the asset, the character of the principal, the character of potential contra positions, and the like. The spread-adjusted prices are then compared to contra spread-adjusted prices for the same asset previously entered into the system. If a match is not identified the system allows for direct, albeit anonymous contact between the initiating position and one or more contra positions for purposes of negotiating a trade. Alternatively, an asset may be entered into the system for a bid or auction process. The spread-adjusted prices may be further adjusted at the position of a system operator to facilitate trading.</p>		

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**Description**

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## **METHOD AND APPARATUS FOR SPREAD-ADJUSTED ELECTRONIC RISKLESS PRINCIPAL TRADING**

### **Background of the Invention**

The sale of an asset is the result of a "meeting of the minds" between the owner-seller of the asset and the intended buyer. In its simplest case, the consummation of such a transfer results from a "face-to-face" negotiation between the parties. For such negotiation to take place, and a successful culmination of a sale or trade activity to transpire, however, the buyer and seller must each first identify the other as a potential participant in the trade. With certain assets the universe of buyers and sellers may be so particularized, or alternatively so diverse and fragmented, that it is difficult to locate a "contra" party and efficiently carry out a trade.

To add efficiency to a marketplace, market systems have been established for various types of assets. The buying and selling of equity securities, for example, is facilitated by the existence of stock exchanges whose members effect the orderly and regulated transfer of such securities.

Exchange members, and others who serve as middlemen for the transfer of assets, do in fact typically provide for increased liquidity and stability with respect to marketability and transferability of the assets with which they deal. In some situations, however, the existence of such intermediation creates complications and difficulties. The deficiencies of conventional market structures for the sale of assets is exemplified by the market mechanisms exploited for the

1 disposition of fixed income securities, such as bonds, in the secondary or after-  
2 issue market.

3  
4 With respect to the transfer of bonds, the use of broker/ dealers and the  
5 like to broker a trade yields a transaction which carries with it an often not  
6 insubstantial cost to the principals. The principals often have little real control  
7 over the ultimate pricing of the asset (the bond), and may also be faced with a  
8 changing market condition resulting from the very fact of placing the bond "in  
9 play". Because of the sometimes limited secondary market for bonds, the  
10 requirement that a broker/dealer make substantial inquiry among potential  
11 buyers can be enough to affect the price of the bond. This phenomena, known  
12 as "market fade" typically depresses the price of the bond, thus lowering the  
13 return to the seller. In addition, it is often difficult for the seller to exert control  
14 or influence upon the nature of the potential purchaser. As a result of general  
15 market influences, a seller of a particular lot of bonds may wish to offer the lot  
16 first to institutional investors or others on the "buy side" before it is made  
17 available to those on the "sell side" such as broker/dealers who presumably must  
18 find another buyer to sell it to. Finding another buyer requires the dealer to  
19 purchase the bonds at a price low enough to factor in his commission. The  
20 present market mechanism for the buying and selling of bonds does not permit  
21 sufficient flexibility to adequately address these concerns.

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1           The identified deficiencies of current bond market mechanisms are not  
2 exclusive to that market. Similar problems and deficiencies may exist with  
3 respect to virtually any market created or which may be created for the sale and  
4 purchase of other assets, wherein the dynamics of the market and the sales agents  
5 associated therewith may prove in some manner deleterious or in conflict with  
6 the individual interests of the principals.

7  
8           It is accordingly the purpose of the present invention to provide a  
9 method and apparatus for the creation of an automated marketplace for the  
10 transfer of assets, such as fixed income securities.

11  
12       Brief Description of the Invention

13           The method of the present invention comprises automated means to  
14 allow the entry of data corresponding to a particular asset to be bought or sold.  
15 Information necessary to sufficiently describe the asset for purposes of making it  
16 available for purchase or sale is provided, the information or "position" being  
17 stored as appropriate, along with data concerning the characteristics or  
18 requirements of the position. For example, the position may be good until  
19 canceled, or may be available only for the present trading day. It may be "firm",  
20 or able to be exercised on the principal's behalf without further authorization, or  
21 may require further confirmation. These data elements are stored with the other  
22 information regarding the position.

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1           Position information is recorded with a timestamp to permit orderly  
2           processing of transactions. When an position/order is processed, it is classified  
3           as to its type, and a price adjustment is calculated and applied to reflect system  
4           overhead costs associated with an anticipated successful transaction. The price  
5           adjustment may take into account several factors or characteristics associated with  
6           the asset and position. Several alternative price adjustments may be computed  
7           to reflect alternative potential transaction scenarios and factors.

8  
9           Once the price adjustment is applied, a search is performed of open  
10          positions reflecting the opposite side of the transaction sought to be carried out  
11          which were previously entered and stored in the system. If a proper match  
12          between the position and a previously entered "contra" position is found, a sale  
13          transaction for the asset is carried out and the matching positions are closed.  
14          Searches can be performed at each of the alternative price adjustment levels.

15  
16          If a match is not found, further search iterations may be performed to  
17          identify contra positions which, based upon the position characteristics entered,  
18          are sufficiently close to the search criteria of the entered position to allow the  
19          principals of the positions to attempt to negotiate a trade. In such a situation  
20          automated means provide notice to the principals of a potential negotiated trade,  
21          and responses from the principals are awaited. If responses are received from  
22          both sides of a potential trade means are enabled to allow the principals to adjust  
23          their original criteria (i.e to negotiate) in an effort to reach an agreement. If no  
24          potential matches are found, or all negotiations fail, the entering position is



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1 retained in the system to be screened as subsequent contra positions are entered  
2 for a match or potential match.

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4 The system also allows the simultaneous transmission of an entered  
5 adjustment position to a class of potential contra-parties, permitting the contra-  
6 parties to enter position or bids for the asset. The contra-party offering the most  
7 favorable position is awarded the trade.

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9 Because the entry of positions and the matching thereof is performed in  
10 a timewise hierarchy, market efficiency and rationality are maintained. The  
11 match process can be performed in an incremental manner, to give priority to  
12 particular contra classes, to adjust the spread, or as otherwise desired to  
13 effectuate a trade. Positions are analyzed and evaluated in an automated  
14 manner, with the identity of the principals not being needed to be disclosed until  
15 a trade has been completed. In addition, negotiations and modification of  
16 system-entered positions can be accomplished without disclosure of the involved  
17 principals, such that the negotiations take place through the system without  
18 identified principal penalty, and without the intervention of an intermediary  
19 unless agreed to by the principals. The resulting market allows efficient  
20 automated asset transfers without loss of the benefits associated with negotiation  
21 when precise correspondence between buy and sell positions cannot be found.

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1        **Brief Description of the Drawings**

10        2                A fuller understanding of the present invention will be achieved upon  
3        3        consideration of the following illustrative description thereof as applied to the  
4        4        bond market, when reviewed in conjunction with the annexed drawings, wherein:

15        5                FIG. 1 is a flowchart of the data entry portion of the invention;

6        6  
7        7                FIG. 2 is a flowchart of position validation and price determination portions of  
20        8        the invention;

9        9  
25        10                FIG. 3 is a flowchart of alternative matching procedure paths;

11        11  
12        12                FIG. 4 is a flowchart depicting the negotiation and price adjustment  
30        13        routines of the invention; and

14        14  
15        15                FIG. 5 is a block diagram of the apparatus of the invention.

35        16  
17        17        **Detailed Description of the Invention**

18        18                A preferred embodiment of the present invention is to provide a method  
40        19        and apparatus for the trading of bonds, which are negotiable instruments which  
20        20        represent the obligation of the issuing party to pay back the owner of the bond  
21        21        a stated sum or sums at a stated date or dates in the future with interest at stated  
45        22        levels and schedules. As negotiable instruments, bonds may be sold and resold  
23        23        at prices which represent either a premium or a discount to the face value of the  
50        24        bond, depending on market conditions, including the prevailing interest rate, the

length of the obligation, the obligor's financial strength, and other criteria. Those skilled in the art, however, will readily recognize that the aspects and features of the invention as described can be applied to the trading of other assets, such as but not limited to stocks, commodities, bills, notes, liens, receivables, etc.

With reference to FIG. 1, the methodology of the present invention commences at 100 by entry of data associated with a particular bond sought to be bought or sold into an input database. Such criteria must include, at a minimum, an identification of the bond, such as by cusip number, an industry-wide identification system which assigns a unique number to a particular security, and which thus implicitly carries with it an identification of the obligor and references the financial terms of the bond. The entered information must also include an identification of the party wishing to take the described position, the quantity of bonds for which the position applies, and the nature of the position.

In addition to being either a buy or sell position, it may be "firm", allowing the desired transaction associated with the position to be executed on the principal's behalf without further confirmation or negotiation, or may be an "indication", which requires further confirmation or negotiation from the principal before the trade is consummated. All firm positions may be considered as having both firm and a negotiation component, although the negotiation component may be said to describe the position as non-negotiable or zero. Any variance from a fixed price is called "the away." Thus, a position seeking to sell 100 XYZ Corp. bonds, cusip # 123456789, may be entered at a firm price of 105, with an away

of 3, meaning that the principal is committed to a sale at a price of 105, but is willing to consider bids from potential buyers at prices of at least 102. An indication position by definition does not have any firm price. Typically, the data may be entered through manual data entry means, such as a keyboard, but other data entry devices may be employed. The data entry devices are coupled to the data processing means of the system.

A firm price may itself be variable, so long as it constitutes a readily determinable or derived value. For example, a valid firm price may be x basis points above the value of a standardized benchmark value. The "firm price" would be automatically recalculated by the system when the benchmark changes. It is firm as it represents a commitment by the principal to a trade at that price.

Upon data entry, the system checks the entered data for validation purposes at 102. The user's i.d. and password are confirmed, as well as validity and format of the entered data with respect, for example, to the identification of the security, the user's authorization to trade such a security, and the like. This is shown in greater detail in FIG. 2. If validation does not occur, the user is given opportunities at 104 to re-enter the data. If validation is not obtained after retries, the session terminates.

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1 With validation accomplished, the user is presented with a menu of  
2 system choices at 106. He can, for example, enter an order, modify a previously  
3 placed order, or cancel an order. He can also view his open positions and is  
4 capable of being contacted by the system for negotiation purposes.

6 In the case of order entry, and with continued reference to FIG. 2, when  
7 validation is achieved the order is entered into an order database at 200, which  
8 assigns a timestamp in addition to the other order data. The system then  
9 performs a classification procedure for purposes of adjusting the price to be used  
10 for subsequent matching. In the case of a bond or other asset offered for sale,  
11 this adjustment increments the price upward, the difference or "spread"  
12 representing a charge to the seller for use of the system. The spread is always  
13 an adjustment to the price specified by the principal, such that the net proceeds  
14 to the seller reflect the full value of the position as entered by the principal.  
15 Similarly, the adjustment or spread applied to a buy position lowers the bid price,  
16 such that the price at which the buy position is offered on the system and which  
17 is available for consummation is lower than the price willing to be paid by the  
18 buyer, the difference in price flowing as a commission to the system operator.  
19 Both buyer and seller experience no additional costs beyond the spread applied.

21 A significant feature of the present invention is the capability to generate  
22 a spread with reference to several characteristics of the asset and to have various  
23 alternative spreads for a given position. With respect to bonds, for example, as  
24 depicted at 202, the characteristics may include consideration of the general and

specific type of bond (202); the volume or size of the position sought to be liquidated or acquired (202); the marketability or creditworthiness of the bond itself (202) (typically as determined by an outside, independent rating agency); the classification of the principal entering the position (202) (e.g. buy vs sell side entity) as well as whether the position is to sell or buy (202) and the desires of the principal regarding the types of entities with whom he wishes to deal and under what circumstances (202).

Each of the characteristics may have an effect upon the price adjustment to be applied to the transaction price stated by the principal. For example, a bond issued by a relatively poor credit risk issuer may command a greater price adjustment to compensate the trading system operator for the expected increased residency of the position in the system before a trade is consummated or increased risk during the settlement procedure of a failure to receive and deliver the security.

The interactions and permutations of the characteristics yield a set of ultimate price adjustments which form a decision matrix of values, represented at 204, the cells of which fully identify the universe of spread adjustments for the intended asset (bond) universe. Such a matrix is typically of multiple dimensions, reflecting each of the variables, such as volume level, transaction side, type of bond (municipal, corporate or convertible corporate) and how the trade can be executed (e.g., good until cancelled, good for the day, etc.).

1 It is to be appreciated that the categories and thus the number of cells  
2 of the decision matrix may be adjusted as desired to provide either less or more  
3 granularity in differentiation of spread adjustment for a given classifying  
4 characteristic. Typically, the spread or adjustment applied by the matrix will  
5 range from .50 to \$1.00 per bond. In addition, means may be provided to  
6 override any calculated spread through manual intervention, as well as to adjust  
7 the spread as the search for matching contra positions proceeds.

8  
9 After the order is written to the database 200, its characteristics are  
10 compared to those of the spread adjustment matrix, and a specific pricing  
11 adjustment array is generated for the position at 204. As depicted by the  
12 alternative pathways, the spread adjustments increment offer or sell price values  
13 upward and bid or buy price values downward. The entered price is adjusted by  
14 the spread values at 206, and an array of adjusted prices is formed at 208.

15  
16 For any set of criteria entered for a position, there will likely be a  
17 plurality of alternative potential matches, with a plurality of spread values  
18 applicable. For example, while a principal may not indicate in his input data any  
19 limitations to the type of contra party with which he wishes to deal, the system  
20 typically still applies different spread adjustments to institutional verses dealer  
21 transactions. In addition, where a volume discount spread value may be  
22 applicable, the system can also apply a non-volume discount spread value. With  
23 the array of adjusted prices created at 208, the matching process is performed.

24

With reference to FIG. 3, once the spread values are determined and applied to the input price data, the system inspects the match parameters associated with the position and determines the number of match iterations to be performed at 300. Depending whether the position is firm, either with or without an away, or is an indication, one of the alternative match iteration pathways 302-310 are traversed.

As depicted, a principal may alternatively specify the types of contra positions against which his position is to be matched. While a firm (without away) position can only be matched against a contra firm position (path 302), a principal entering a firm with away position can specify whether to consider, in addition to firm contra positions, contra buy side away positions (path 304); contra buy side away and indication positions (path 306); contra buy side away and indication positions and regional dealer away/indication positions (path 308); or contra buy side away and indication positions and both regional dealer and tier one dealer positions (path 310). Consideration of each of those types of positions invoke that negotiation aspect of the invention, as discussed infra. The hierarchy of contra-positions depicted in FIG. 3 provides a bias in favor of institutional (buy-side) trades; the order of trade steps can be modified as desired.

Irrespective of the pathway 302-310 to which the trade is directed, the entered or initiation position is first attempted, at 312, to be matched with a previously-entered and open contra position for the same asset at the same spread-adjusted price and at a matching quantity level. All open contra-positions



in the order database file are examined. Because each previously-entered position has associated with it a similar array of spread-adjusted price values, the particular price examined for a contra-position will reflect the corresponding adjustment applicable to the characteristic of the initiating position against which it is being compared.

The "autotrade" matching phase of 312 may itself be segmented into several iterations. It can include iterations at spread-adjusted prices with and without volume adjustment, as well as separate iterations against contra positions entered by buy and sell side entities. As depicted in FIG. 2 at 204-208, the price array for a position may typically include firm prices at a variety of price points reflecting alternative pricing considerations. The system can allow for prioritization and ordering of the prices in an order which maximizes the return to the system operator, while still maintaining the desired preferences of the principal.

Such an ordering normally results in the performance of a first matching process in an attempt to find a match based upon firm spread-adjusted prices for the asset without consideration of any price adjustment that may be applicable due to volume considerations. A high-volume position may be entitled to a smaller system-applied price adjustment; the first match process iteration, however, may not apply such an adjustment in seeking a matching position. Further, the system may first attempt to match the position with a contra position entered by a principal classified as an institution or buy-side entity. If no match

1 is made a volume-based price adjustment (if applicable) to the adjusted price may  
2 be made, and the attempted matching procedure repeated with respect to contra  
3 institution (buy-side) positions. If no match is made with the volume adjustment  
4 the volume adjustment is removed, and a search is carried out with respect to sell  
5 (dealer) side contra positions. Once again, if no match is made the volume  
6 adjustment can be made and the matching process is repeated. The number and  
7 character of match iterations, as well as the order in which they are performed,  
8 are parameters which can be adjusted or varied as may be desired.

9  
10 Typically, the database of positions is maintained in an appropriate  
11 storage facility, such as a disk drive. While each position may be maintained in  
12 the form of an array reflecting the applicable spread-adjusted prices, in practice  
13 the spreads are recalculated and applied each time a matching iteration is carried  
14 out, to allow the benefit of any changes to spread factors which may have arisen  
15 subsequent to entry of the position to be applied. In theory, each position record  
16 can be reviewed for a possible match. It is recognized, however, that the records  
17 may be sub-indexed as known in the art to facilitate the search and match  
18 process, allowing only relevant positions to be identified and their spread arrays  
19 to be recalculated as needed during a match iteration.

20  
21 If a match is found during the automatic or autotrade process, an  
22 identification associated with the matching record is retrieved and utilized to  
23 generate a reporting or messaging signal to the respective principal. At the same  
24 time, a notification is transmitted to the principal associated with the initiating

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1 position. Principal intervention and confirmation is neither sought or required.  
2 The trade is executed automatically and settlement documentation generated.

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4 It is possible that more than one potential matching contra position may  
5 exist in the database. In such a case, the position having the earliest system entry  
6 time stamp is chosen. Once the transaction is consummated the matching records  
7 are appropriately marked so they can be removed from subsequent match search  
8 operations and can be identified for report-generation routines.

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10 It is also possible that the search will identify a firm contra position at  
11 a price which generates a benefit to the parties. For example, a search at a  
12 spread-adjusted firm sell price of 105 may identify a matching buy position at the  
13 higher spread-adjusted price of 106. Striking a transaction at a price between 105  
14 and 106 is beneficial to both parties, as the seller is netting more than he wanted  
15 while the buyer is paying less than he was willing to pay. Means may be provided  
16 to share or allocate the "price improvement" to the parties in accordance with  
17 pre-determined formulas. For purposes of identifying the contra position for a  
18 given trade, the system typically is designed to perform a "best price" analysis,  
19 such that a trade giving price benefits to the parties would have priority over a  
20 trade at an exact matching price for a given set of criteria.

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22 As further illustrated in FIG. 3, a feature of the present invention is the  
23 ability to facilitate transactions by identifying contra positions which, while not  
24 a price match resulting in an autotrade, have characteristics or criteria which may

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1 lead to a negotiated transaction. By "negotiated" it is meant that the principals  
2 have indicated, by inclusion of an "away" value in their positions or by the entry  
3 of a pure indication position, some degree of flexibility in their price  
4 requirements, such that they may be in a position to present a firm position in  
5 response to a particular contra offer. Accordingly, if an exact match is not found  
6 at 312, the present methodology along pathways 304-310 performs one or more  
7 subsequent matching searches 314-320 to identify such potential contra-  
8 negotiation positions. The nature and content of the subsequent matching  
9 searches may be tailored to the nature of the asset base. As with the autotrade  
10 portion of the methodology, the system screens the contra positions according to  
11 a hierarchy, giving preference to institution, as opposed to dealer positions, and  
12 can consider the specific nature of the positions involved.

13  
14 The first iteration of negotiated trading, at 314, identifies contra firm  
15 with away positions entered by buy-side or institutional principals. If no  
16 corresponding positions having an adjusted price falling within the spread-  
17 adjusted range for the initiating position are identified, and the trade criteria  
18 associated with the initiating position permit it, the next iteration, at 316,  
19 attempts to identify overlapping indication positions entered by buy-side entities.  
20 If no corresponding positions are identified, the iterations continue as may be  
21 appropriate to identify away or indication positions entered by regional sell-side  
22 entities at 318 and away or indication positions of "tier one" sell side entities at  
23 320. At each level of iteration, however, the matching screening may be  
24 performed two or more times, first with the "away" price not reflecting any

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1 volume adjustment, and thereafter with the different levels of appropriate volume  
2 adjustments applied. Typically, each level or iteration utilizes a different value  
3 (or values) of spread-adjusted prices as appropriate.

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5 It is to be further recognized that any (or all) of the entity classes  
6 reflected by iteration levels may be further segmented into subclasses and/or  
7 individual entities for prioritization and/or inclusion/exclusion with respect to the  
8 matching process. A potential match at a particular class will prevent further  
9 iteration at a subsequent class level. Similarly, a position entered by a dealer can  
10 be made available for matching only with institutions or with both institutions and  
11 dealers. Typically, however, a dealer position will not be subject to separate  
12 iterations between contra firm with away positions and contra indication  
13 positions.

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The negotiation procedure is depicted in FIG. 4, along with alternative  
pathways to ultimate trade execution. The results of the matching process of Fig.  
3 can yield a firm match at branch 402, a match of away or indication positions  
subject to negotiation at branch 404, or a non-matching situation at branch 406  
which can invoke supervisory powers of a system operator, as will be discussed  
infra. A firm match results in the trade being executed at 408, while the match  
of away positions sets up the negotiation process.

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1 A particular feature of the present invention is that negotiations can be  
2 commenced in an anonymous manner, whereby the negotiation process is not  
3 prejudiced by disclosure of the identity of the parties unless a participating party  
4 desires that its identity be made known to the system operator. Contra away (or  
5 indication) positions falling within the adjusted price range of a given matching  
6 iteration step are flagged to allow a routine to be entered to commence the  
7 negotiation process. In a first step, shown generally at 410, the initiating principal  
8 party is advised of the existence of at least one potential contra position for  
9 negotiation. The identity of the contra party is not disclosed. The principal is  
10 alerted automatically, such as by an indication appearing on its display through  
11 a screen in which his open positions are displayed and wherein the one (or ones)  
12 for which potential negotiations are available are highlighted. The positions are  
13 shown in the form entered by the principal; no spread adjustment is presented.  
14 The initiating party then has the option of confirming its desire to participate in  
15 a negotiation. If the invitation is declined, either by inaction or by a notification  
16 of rejection entered into the system, the match routine is terminated, and the  
17 principal's position is added to the database as an open position available to be  
18 matched to new contra positions as they are received by the system. Because the  
19 identity of the potential negotiating party or parties is not disclosed, the principal  
20 cannot opt to reject a particular negotiating session in the hopes of subsequently  
21 dealing with a different contra party.

1           If the invitation is accepted a confirmation signal is passed to the system,  
2           which then messages each of the flagged contra positions of a potential  
3           negotiated match at 412. Such messaging, as is the messaging to the initiating  
4           party, may be in one of several forms, including a screen message if the party  
5           maintains an on-line connection with the system, or by automated telephone or  
6           facsimile transmission. Each contra party is also able to display a screen in which  
7           its positions are displayed, with the position available for negotiation highlighted.  
8           The contra parties are not advised as to the specifics of the position with which  
9           they have been matched; each party knows only that an open position falling  
10          within its "away" criteria has been received by the system and is available to it for  
11          negotiation. The contra parties then "compete" for the right to enter into  
12          negotiation solely by coming on line for a negotiation session. The first party  
13          responding affirmatively is then placed in electronic communication with the  
14          initiating party.

15  
16           If no contra party expresses an interest in negotiating within a set time,  
17          the opposing principal is advised of the lack of interest, and the system either  
18          continues along the search hierarchy chain of Fig. 3 if appropriate seeking other  
19          contra positions to be considered. If no further potential contra positions are  
20          flagged or available to be searched, the match search is ended and the initiating  
21          position is added to the database of open positions.

1           Once a contra party responds with an affirmative desire to negotiate,  
2           electronic communication is established between the parties at 414, and each of  
3           the parties is shown the spread-adjusted position of the other. Again, it is to be  
4           emphasized that the identity of each party is not disclosed to the other; only the  
5           pertinent data necessary for trading purposes is presented. The initiating party  
6           then has the opportunity to modify its price or keep the price as originally  
7           displayed. Control is then passed to the responding or contra party for a  
8           corresponding price adjustment. Such "negotiation" and passage of control from  
9           party to party continues until an agreed price is reached or a deadlock results and  
10          either of the participants exits or terminates the negotiation.

11  
12           If a negotiated price is agreed upon, acceptance information is passed to  
13          a supervisory system, which then executes the trade in accordance with the agreed  
14          upon parameters. In the case of deadlock and exit, the negotiation is terminated.  
15          Because orders entered into the system may include an active timespan, and  
16          because the system is constantly receiving new orders, the initiating offer is again  
17          placed in the input queue and a full matching process begins again. If the  
18          automatic trade matching process finds a matching firm contra position, the  
19          transaction is executed. If no automatic match is found, the next level search is  
20          again performed to identify potential negotiation away positions (with the  
21          exception of the contra position previously negotiated with). If such positions  
22          exist, a new notification process occurs. This sub-routine of re-searching for  
23          matches and potential negotiation matches repeats until a trade is carried out,  
24          there are no longer any further potential contra negotiating positions in the



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1 system, or the initiating party indicates that it is no longer interested in a  
2 negotiation session.

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4 Although a negotiation session is initiated with the contra party who first  
5 responded to the negotiation offer, the remaining contra positions which were  
6 notified of the potential negotiation still have the opportunity to participate, so  
7 long as their participation is to the benefit of the initiating principal. Even  
8 though a negotiation is commenced, the remaining potential negotiation contra  
9 positions have the ability to offer their positions to the initiating party. While the  
10 remaining contra parties are not advised of the status of on-going negotiations,  
11 they can submit their positions at 416. If the adjusted price in the system of a  
12 contra wishing to enter the negotiations is of more advantage to the initiating  
13 principal that the negotiating contra's current price at 418, the negotiating contra  
14 is advised of the better price and given the opportunity to meet or exceed by a  
15 calculated amount depending on system parameters, the price at 420. If the new  
16 price is not met, the contra offering the new price is substituted in the  
17 negotiation for the original negotiating contra party at 424. If the original  
18 negotiating contra meets the price at 426 he remains as a negotiating party. In  
19 either event, however, the new price is presented to the opposing initiating  
20 principal. Since the identity of a negotiating party is not disclosed to the other  
21 party, the initiating party is not aware that the contra party has changed. He  
22 simply maintains the benefit of the best contra price available to him.

1           The negotiation continues at 422. Although the non-participating contras  
2           are not advised as to the status of negotiations (until the negotiation ends) or the  
3           current negotiated price "on the table," each maintains the ability to have its  
4           posted price considered for substitution for the currently offered price. The  
5           negotiation process ends with either an acceptable price being reached by the  
6           current parties to the negotiation or a stalemate.

7  
8           The third branch 406 depicted in Fig. 3 depicts spread-adjusted  
9           intervention, which is an aspect of the invention which allows facilitation of a  
10          trade by the system when a pair of opposed entered positions do not result in an  
11          autotrade, but deviate by less than the spread applied by the system. Routines  
12          allow the system operator to display open contra positions which meet such a  
13          criteria. Thus, for example, a non-spread-adjusted bid of 100.10 and a non-  
14          spread-adjusted offer of 100 would not generate a trade, even though they  
15          overlap on price. Once the system applies a spread greater than .1 (for example  
16          .11) the resulting spread-adjusted bid of 100.49 and offer of 100.51 do not  
17          overlap, and thus no match can be made.

18  
19          The system operator is enabled to selectively adjust one or more of the  
20          spreads of opposing positions to allow a trade to be effectuated. Adjusting the  
21          spread(s) to yield a match then allows the system to autotrade the transaction at  
22          the spread-adjusted, intervention-established price. Such adjustment can also be  
23          made to effect a negotiation session. As the cost to be parties is not adversely  
24          affected by the adjustment, spread-adjusted intervention allows the system

1 operator to close out positions and effectuate trades which would otherwise not  
2 be made. The initiation of the spread adjustment process, shown at 432, may be  
3 upon the initiative of a system operator, may be result of a request for  
4 involvement of a system operator by a negotiating party, as discussed in further  
5 detail below, or may be as the result of preestablished automatic routines which  
6 invoke adjustments subject to set criteria, such as the length of time a position  
7 has been in the system or the time of day. The adjustment may be manually  
8 entered at 434 by a system operator, or may be carried out automatically at 436.  
9 In either event, its purpose is to allow a trade to be consummated. It is also  
10 possible, however, to adjust spreads for purposes of facilitating trades in a more  
11 "global" manner without specific reference to a given position.

12  
13 At any time during a negotiation, either party has the ability to request  
14 the assistance of a system representative at a "help desk" for purposes of  
15 attempting to facilitate a trade. This may be accomplished, for example, by the  
16 party choosing an "involve desk" icon on its screen or activating an appropriate  
17 keystroke. Again, the help desk is not aware of the identity of the parties unless  
18 a party specifically authorizes such disclosure. The contra party to the requesting  
19 party is made aware of the request the next time control shifts to the contra  
20 party. If a deal is consummated with the assistance of the help desk, the  
21 transaction is consummated. Otherwise, the parties depart as discussed above.  
22 With the involvement of the help desk, however, there is the facility for  
23 adjustment of the spread or system overhead through the system operator, which  
24 may be appropriate or desirable when a transaction cannot otherwise be made.

1  
2 In addition to implementing autotrade and negotiated trades, the present  
3 invention allows the implementation of automated auction trading, also known  
4 as "bids wanted" or "offers wanted". In auction trading a specific firm position is  
5 entered into the system in a manner whereby it is displayed to subscribers for a  
6 fixed limited duration. The subscribers to whom it is displayed may be chosen  
7 as desired by the offering principal and/or system operator, and may, for  
8 example, be all subscribers, only a particular class or classes of subscribers, or  
9 subscribers who have previously indicated an interest in auctions or the particular  
10 type of security being auctioned. Notification to the subscribers can be by a  
11 variety of means, including e-mail, fax, telephone, and the like.

12  
13 The auction commences by the display of the security and may or may  
14 not include an offering price. The bidders each enter a bid, which is received by  
15 and stored by the system. Bids are collected and stored during the duration of  
16 the auction, and are not displayed on the system. When the auction is over, the  
17 bids are analyzed to determine the bid or bids which are most advantageous to  
18 the offerer's position. Depending on the criteria established for the auction, one  
19 or more, or no, bids may be found acceptable. An autotrade is performed with  
20 respect to the acceptable bid(s) and the transactions are consummated. A similar  
21 auction process may be employed for a given buy position (offers wanted).

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1 As depicted in Fig. 5, the present invention is preferably implemented  
2 through a distributed computer-based system, the elements thereof being coupled  
3 together through a network, such as the Internet. It is contemplated that users  
4 500 of the system will preferably have a personal computer 502 with a monitor  
5 504 and keyboard 506 and a connection to a network 508 allowing  
6 interconnection to the main computer facility 510 operated by the system  
7 manager. Each user is provided with a password to allow access to the main  
8 computer facility 510, having processor 512, storage means 514 along with one or  
9 more displays 516 and local input means 516 for the system operators and the  
10 transmission and receipt of data, in accordance with the nature and type of  
11 account set up. Transaction information can be entered from, and order status  
12 and confirmation data can be received at, the user's remote location. In addition,  
13 data reflecting open positions on the system, as well as other data, can be viewed  
14 in accordance with system and user protocols.

16 Any position entered for trading may be either "hidden" or "displayed",  
17 at the discretion of the principal. A displayed position allows other users of the  
18 system to view the position. A principal can request that the position be hidden,  
19 and thus not posted for viewing, although it remains fully in the system for  
20 purposes of auto-trades and negotiation. The party may indicate the nature of  
21 the position by entering a notation in the appropriate field in an input data form  
22 or sheet. When a position is displayed by the system, a system user can respond  
23 thereto by entering a contra position intended to meet or provide potential  
24 negotiation with the entered position or, alternatively, a position can be marked

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1 or highlighted on the user's display, the entry of an appropriate command  
2 automatically accepting the terms of the marked position, the system in effect  
3 generating a matching contra position allowing the intended trade to be made.

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5 The nature of the information available and displayed to system users  
6 provides users the data required to evaluate market conditions for the assets  
7 offered, without display of the identity of the principals associated with the  
8 identified positions. Because of the varied nature of the intended users of the  
9 system, including both "buy side" institutional principals as well as "sell-side"  
10 broker/dealers, substantial flexibility is provided to control the nature of the  
11 information displayed to a particular user. Those skilled in the art will recognize  
12 the variations, adaptations and modifications to the invention and its aspects as  
13 specifically set forth herein can be accomplished without departing from the  
14 natura and scope of the invention.

**Claims**

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1 I claim:

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2 1. A automated system for effecting an asset transaction between principals  
3 as seller and buyer upon position criteria dictated by the principals, comprising:

4 means for entering position criteria data for the asset into a database;

15

5 means for generating a plurality of alternative price data for the asset  
6 based upon consideration of the position criteria data and for creating and storing  
7 an array of such alternative price data;

20

8 means for retrieving and comparing each of said alternative price data  
9 to a previously created and stored array of alternative contra sales price data for  
10 the asset; and

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11 means for recording a sale transaction for the asset if an alternative price  
12 matches a contra sales price and for maintaining the array of alternative price  
13 data as previously created and stored contra sales prices for a subsequently  
14 entered contra position for the asset.

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16 2. The system of claim 1 further comprising means for ranking each  
17 of said alternative price data in a manner which allows them to be retrieved on  
18 a sequential basis, said retrieving and comparing means having means for  
19 performing the retrieval and comparison on the sequential basis.

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21 3. A automated system for effecting an asset transaction between  
22 principals as seller and buyer upon position criteria dictated by the principals,  
23 comprising:

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1 means for entering position criteria data for the asset into a  
2 database and

3 means for generating alternative price data for the asset based  
4 upon consideration of the position criteria data and for creating and storing an  
5 array of such alternative price data,

6 whereby the prices of said array may be accessed for matching  
7 purposes with a calculated price for a contra position for the asset.

8  
9 4. The system of claim 1, wherein said means for generating  
10 alternative price data comprises means for generating both firm and away  
11 position price data and said means for recording a sale transaction for the asset  
12 records a sales transaction if a firm alternative price matches a contra firm price  
13 for the asset.

14  
15 5. The system of claim 5 further comprising means for generating a  
16 notification signal if an away price matches a contra away price.

17  
18 6. The system of claim 5, wherein said notification signal generation  
19 means comprises means for advising the principals of the matching away and  
20 contra away prices and allowing the principals to be placed in direct anonymous  
21 electronic communication with each other for purposes of negotiating a  
22 transaction for the asset.

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1                   7.     A automated system for effecting an asset transaction between  
2                   principals as seller and buyer upon position criteria dictated by the principals,  
3                   comprising:  
4                         a plurality of distributed terminals for the entry of position criteria  
5                   data and the display thereof;  
6                         network means coupling said distributed terminals to a system  
7                   processor, said system processor comprising:  
8                         means for entering position criteria data for the asset into a  
9                   database;  
10                        means for generating a plurality of alternative price data for the  
11                   asset based upon consideration of the position criteria data and for creating and  
12                   storing an array of such alternative price data;  
13                        means for retrieving and comparing each of said alternative price  
14                   data to a previously created and stored array of alternative contra sales price data  
15                   for the asset;  
16                        means for recording a sale transaction for the asset if an  
17                   alternative price matches a contra sales price and for maintaining the array of  
18                   alternative price data as previously created and stored contra sales prices for a  
19                   subsequently entered contra position for the asset; and  
20                        means for communicating with said terminals to allow sale  
21                   transaction information to be passed thereto.  
22

1           8.     A automated system for effecting an asset transaction between a  
2     principal as seller and a selected principal as buyer upon position criteria dictated  
3     by the principals, comprising:

4                 means for entering sell position criteria data for the asset into a  
5     database;

6                 means for generating a plurality of alternative price data for the  
7     asset based upon consideration of the position criteria data and for creating and  
8     storing an array of such alternative price data;

9                 means for displaying selected one of said alternative price data to  
10    remote principals for consideration;

11                means for entering and recording contra position data entered by  
12    remote principals, identifying the contra position most favorable to the sell  
13    position criteria and recording a sale transaction between the seller and the  
14    principal having the most favorable contra position.

15  
16           9.     The system of claim 8, wherein said means for entering sell  
17    position and contra position data comprise remote data entry and display means  
18    coupled through a network to a local system processor.

19  
20           10.    A method for effecting an asset transaction through an automated  
21    trading system between principals as seller and buyer upon position criteria  
22    dictated by the principals, comprising the steps of:

23                entering position criteria data for the asset into a database;

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1 generating a plurality of alternative price data for the asset based upon  
2 consideration of the position criteria data and for creating and storing an array  
3 of such alternative price data;

4 retrieving and comparing each of said alternative price data to a  
5 previously created and stored array of alternative contra sales price data for the  
6 asset; and

7 recording a sale transaction for the asset if an alternative price  
8 matches a contra sales price and for maintaining the array of alternative price  
9 data as previously created and stored contra sales prices for a subsequently  
10 entered contra position for the asset.

11

12 11. The method of claim 10 further comprising the step of ranking  
13 each of said alternative price data in a manner which allows them to be retrieved  
14 on a sequential basis, said retrieving and comparing step comprising the retrieval  
15 and comparison on the sequential basis.

16

17 12. A method for effecting an asset transaction between principals as  
18 seller and buyer upon position criteria dictated by the principals through an  
19 automated trading system, comprising the steps of:

20 entering position criteria data for the asset into a database;  
21 generating alternative price data for the asset based upon consideration of the  
22 position criteria data and for creating and storing an array of such alternative  
23 price data; and

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1                   accessing the prices of said array for matching purposes with a  
2                   calculated price for a contra position for the asset.

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4                   13. The method of claim 10, wherein said step of generating  
5                   alternative price data comprises generating both firm and away position price  
6                   data and said step of recording a sale transaction for the asset records a sales  
7                   transaction if a firm alternative price matches a contra firm price for the asset.

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9                   14. The method of claim 13 further comprising the step of generating  
10                  a notification signal if an away price matches a contra away price.

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12                  15. The method of claim 14, wherein said notification signal  
13                  generation step comprises advising the principals of the matching away and  
14                  contra away prices and allowing the principals to be placed in direct anonymous  
15                  electronic communication with each other for purposes of negotiating a  
16                  transaction for the asset.

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18                  16. A method for effecting an asset transaction between a principal  
19                  as seller and a selected principal as buyer upon position criteria dictated by the  
20                  principals through an automated trading system, comprising the steps of:

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21                         entering sell position criteria data for the asset into a database;  
22                         generating a plurality of alternative price data for the asset based  
23                         upon consideration of the position criteria data and creating and storing an array  
24                         of such alternative price data;

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1 displaying a selected one of said alternative price data to remote  
2 principals for consideration;  
3 entering and recording contra position data entered by remote  
4 principals, identifying the contra position most favorable to the sell position  
5 criteria and recording a sale transaction between the seller and the principal  
6 having the most favorable contra position.  
7

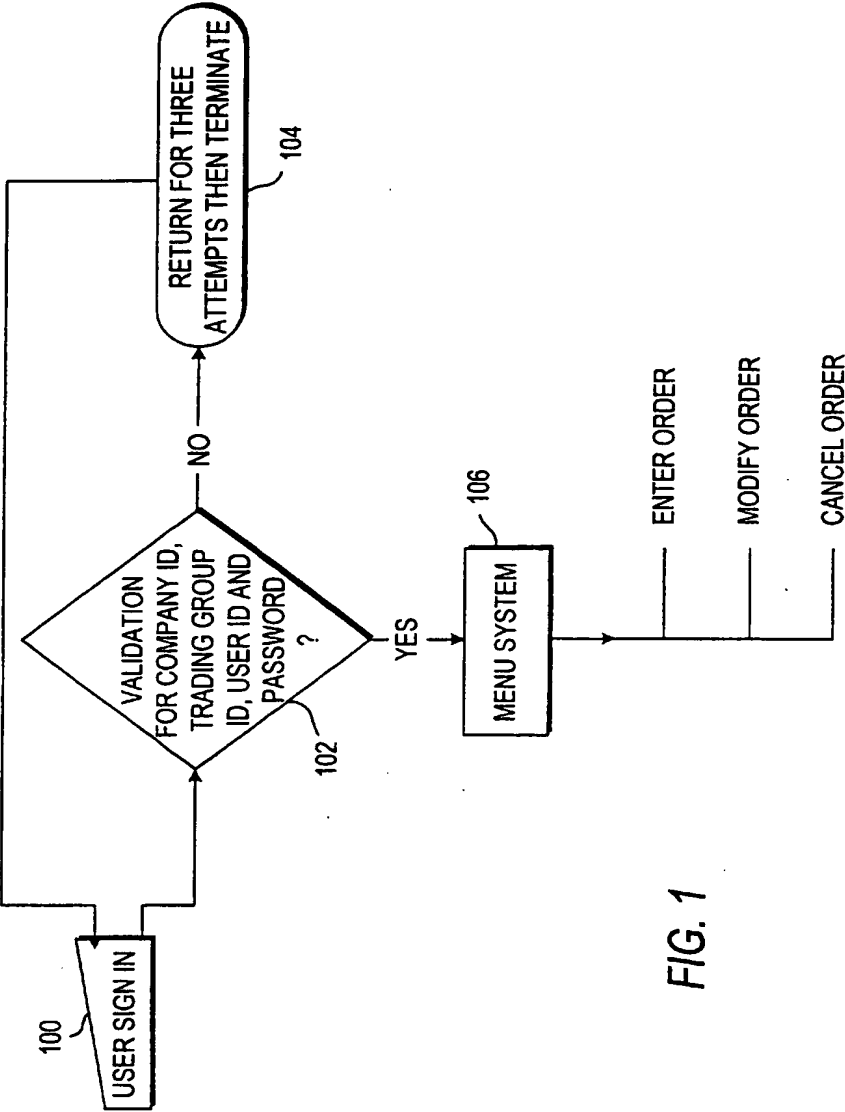
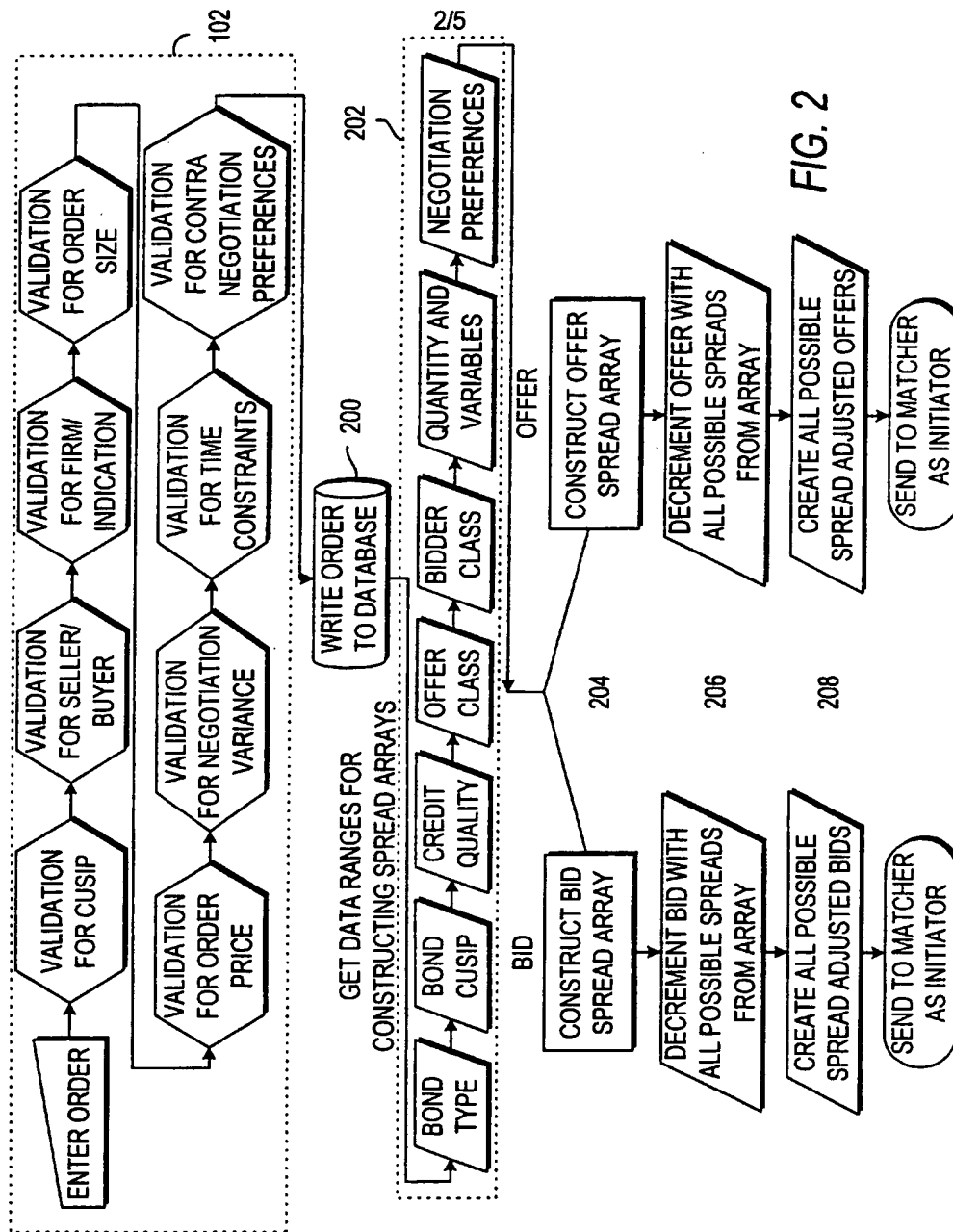


FIG. 1

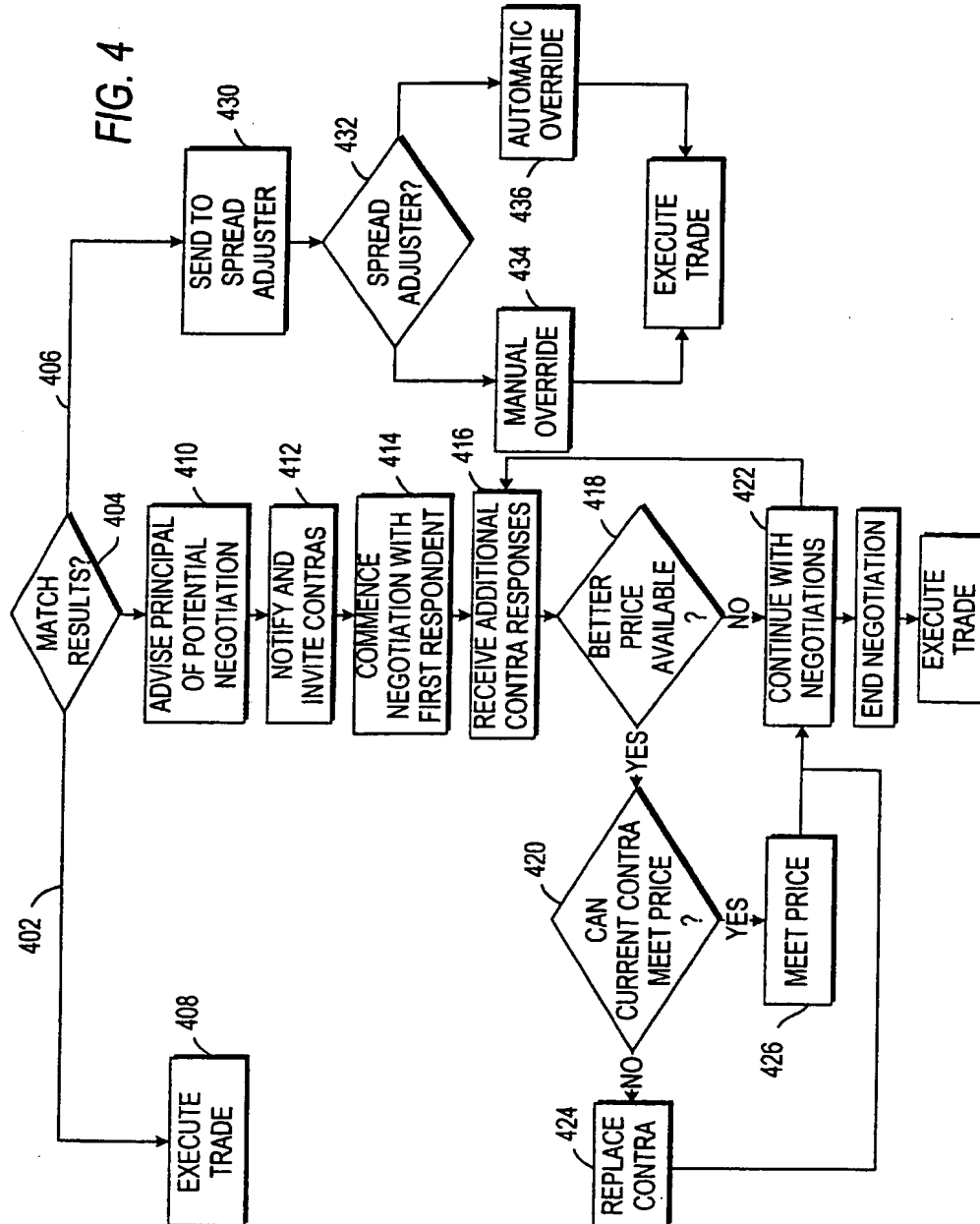






4/5

FIG. 4



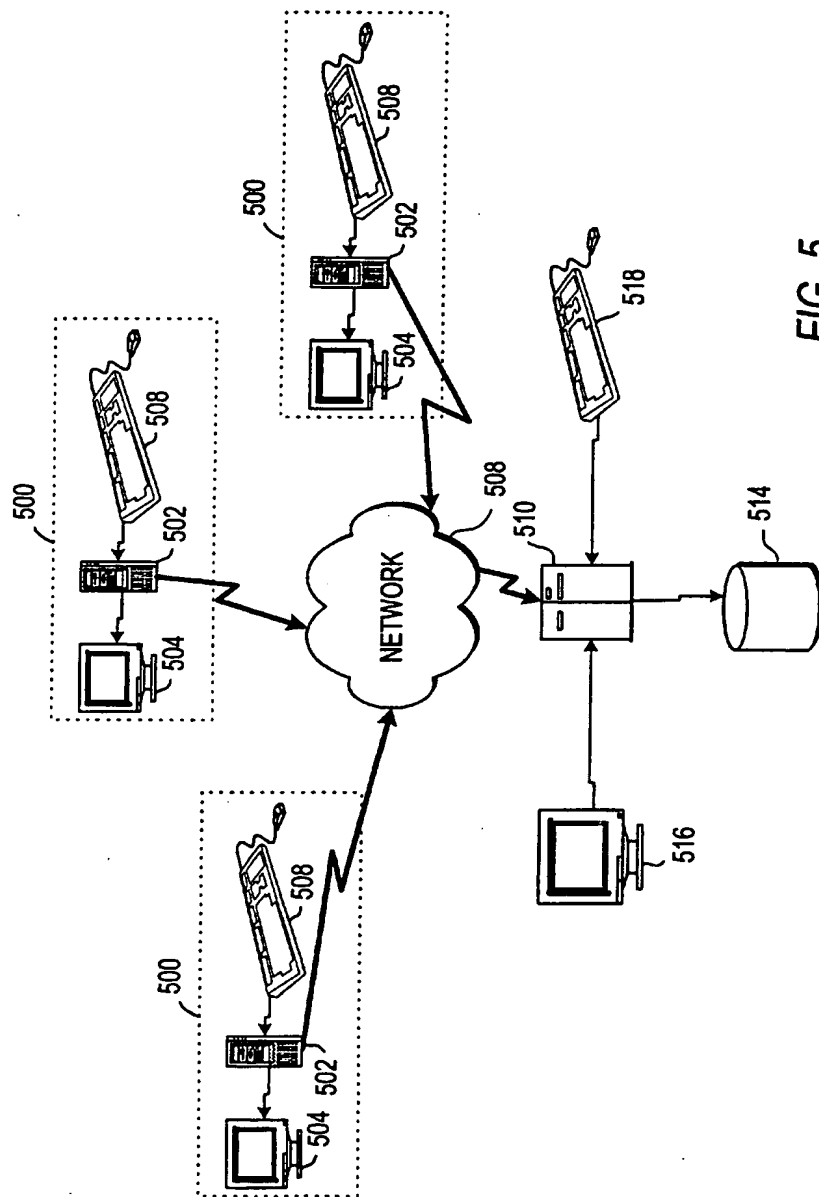


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/30763

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60  
US CL : 705/37, 35, 26, 27

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/37, 35, 26, 27

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## DIALOG

search terms: trading, matching, auction, bidding, ranking prices, notification signal, negotiate

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 5,924,082 A (SILVERMAN et al) 13 July 1999; column 6, lines 17-25; columns 7-10; column 11, lines 39-58; column 12; column 13, lines 30-50; figures 1, 5A, 5B.	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

\* Special categories of cited documents

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\*

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\*

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\*

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*A\*

document member of the same patent family

Date of the actual completion of the international search

21 MARCH 2000

Date of mailing of the international search report

07 APR 2000

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